

POISONOUS SPIDER BITES, WITH ESPECIAL REFERENCE TO THE LATRODECTUS MACTANS

A CLINICAL AND HISTORICAL STUDY OF A WIDESPREAD BUT LITTLE KNOWN CONDITION

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THE EDITOR: *The importance of arachnidism caused by the bite of Latrodectus mactans (Black Widow spider) is usefully re-emphasized by Bogen and Berman in this discussion.*

The wide prevalence of this dangerous spider in certain sections of California is not generally recognized. Although the bite is rarely fatal, it does produce serious acute illness with distressing symptoms which may easily lead the unwary physician to make a wrong diagnosis and even subject the patient to needless surgical interference.

A CLINICAL complex closely simulating an acute abdominal disease may be produced in man by the bite of the *Latrodectus mactans*, a poisonous spider of North America commonly known as the Black Widow, shoe button, or hourglass spider. Fifteen patients suffering with this condition have been treated at the Los Angeles General Hospital in recent years. The diagnosis was not made at the time of admission in the first five instances, perhaps because we were not then familiar with the disease, for there has been no difficulty in recognizing the eight cases which were seen during the last year. A brief summary of the case reports may help to visualize the condition encountered in these patients.

CASE 1—A Mexican laborer, age 29, while sitting in an outdoor toilet at Palo Verdes was bitten on the penis by a spider. He had severe pain and muscle spasms, which lasted about two days.

CASE 2—A Mexican laborer, age 25, was admitted, doubled up in acute pain in the abdomen, legs and arms, with a tentative diagnosis of acute appendicitis. The abdomen was rigid but not tender, and the temperature was 101°. He stated that he had been bitten on the side of the abdomen by a black spider, and in two days was discharged as well.

CASE 3—A Hungarian laborer, age 37, while sitting in an outdoor toilet in Los Angeles was bitten on the penis by a black spider. The severe pains which followed spread up the inguinal region on each side into the abdomen and thighs. On admission he was writhing in pain, cyanotic, the abdomen was rigid although not tender, and the knee jerks were hyperactive. He vomited several times and had urinary retention requiring catheterization. The systolic blood pressure was 170, the white blood count 13,750. Although the most severe pains had diminished within twenty-four hours, it was five days before he was able to leave the hospital.

CASE 4—An American acetylene welder, age 42, was admitted with a tentative diagnosis of acute appendicitis. A severe pain, starting in the scrotum and lower right

quadrant, had spread over the entire abdomen, which was of a board-like rigidity, but showed no areas of tenderness. Profuse perspiration, respiratory distress, urinary retention requiring catheterization, obstinate constipation, a fever of 100°, and a leukocytosis of 21,800 with a trace of albumin in the urine complicated the picture, and the suggested diagnoses varied from lobar pneumonia to food poisoning, ruptured gastric ulcer or acute appendicitis. However, the symptoms soon subsided, and the patient remembered that five minutes before the onset of the pain he had been bitten on the end of the penis while in an outdoor privy. Several days later he was discharged completely recovered.

CASE 5—An American watchman, age 51, was bitten on the penis by a spider while in an outdoor toilet in Baldwin Park. Severe pain was felt in the lower abdomen, extending into the thighs and accompanied by vomiting, hiccupping, and marked nervousness. The blood pressure rose to 165 systolic, the stool contained blood, the urine a trace of albumin, and the temperature went up to 100°. All symptoms subsided, and the patient was discharged three days later.

CASE 6—An American cowboy, age 22, was bitten between the shoulders by a black spider. Pain arose in the back and spread to the chest, abdomen and legs, and he became dizzy, cyanotic, short of breath, and vomited repeatedly, remaining in the hospital for nearly a week.

CASE 7—A Mexican laborer, age 25, while sitting in an outdoor toilet was bitten on the penis by a spider. He complained of severe abdominal pain and his abdomen felt very rigid, but was not tender. The white blood cell count was 13,600. He perspired freely and by the next day was able to leave the hospital.

CASE 8—A Mexican laborer, age 18, was bitten on the penis by a black spider in an outdoor toilet. Severe pain radiated down his legs and up over the abdomen, and speech and even breathing became difficult. Other symptoms included profuse perspiration, vomiting, cyanosis, constipation, and a temperature of 100°. The abdomen became very rigid but not tender, reflexes hyperactive, systolic blood pressure 152, white blood cells 18,700. The patient remained in the hospital for nearly a week.

CASE 9—A Mexican laborer, age 38, while sitting in an outdoor toilet in Belvedere was bitten on the penis by a small black spider. When seen an hour later he was doubled up with pain in the abdomen, chest, legs, arms, and back of the head. Nausea, vomiting, temperature 100°, profuse perspiration and intense thirst followed. The abdomen was markedly rigid throughout but not tender, the knee jerks were hyperactive, and the scrotum was contracted and penis erectile. The blood pressure was 154 systolic, the white cell count 16,000 with 89 per cent polymorphonuclears, and the urine contained numerous casts. The most acute pain began to subside within twenty-four hours, but the patient remained in the hospital for more than a week.

CASE 10—A negro laborer, age 36, was bitten on the penis while in an outdoor toilet. This was followed by a severe cramping pain in the groins and legs, later spreading to the chest and arms. The abdominal wall was very rigid but not tender, the scrotum contracted, and the body covered with a profuse perspiration. The systolic blood pressure was 150, the white count 12,400, the urine contained a trace of albumin and occasional casts, and the temperature rose to 100°. Twelve hours after the bite he was given 40 cc. of whole blood taken from the previous patient, intramuscularly, and within a few hours was feeling greatly relieved, and left the hospital on the third day.

CASE 11—A German painter, age 49, was bitten on the scrotum by a spider in an outdoor toilet in Los Angeles. Pain gradually spread over the groins and back and became very severe in the chest and legs. The abdomen was markedly rigid, the knee jerks hyperactive, and the white blood count was 16,400. The pain diminished within twenty-four hours, and the patient went home the next day.

CASE 12—An American carpenter, age 45, was bitten on the penis by a spider while in an outdoor toilet in Monterey Park. A sharp pain spread from the groins

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over the entire body, and was accompanied by chills, nausea, vomiting, fever up to 100, and drenching sweats. The abdomen was rigid and tender, the systolic blood pressure was 150, the white blood cell count 14,600 with 94 per cent polymorphonuclears, and the reflexes were hyperactive. Fourteen hours after the bite, 15 cc. of convalescent serum was injected intramuscularly, and the next morning the patient was feeling much better, but he stayed in the hospital for three days.

CASE 13—An American factory worker, age 16, was bitten on the back by a black spider while at work. Aches and pains in the arms, legs and back, increased until the boy was doubled up in agony, the abdomen became rigid and the body was covered with perspiration. The systolic blood pressure was 150 and the white blood cell count 12,600. Seven hours after the bite he was given an intramuscular injection of 15 cc. of convalescent serum, and soon felt much relieved, leaving the hospital the next morning.

CASE 14—An American laborer, age 65, was bitten on the scrotum by a black spider in an outdoor toilet. Severe pains, especially in the back, were followed by numbness and tingling in the hands and feet and general weakness. He came to the hospital several days later, bringing the spider, a *Latrodectus mactans*, and was treated in the outpatient clinic for a number of days, complaining of marked weakness.

CASE 15—An American boy, age 14 months, was bitten by a black spider while sitting on a wicker stool. He cried out and continued to moan in pain, even after he had been rendered stuporous by heavy doses of chloral and morphin, and developed urinary retention, board-like abdominal rigidity, and edema of the legs. Six hours after the bite he was given an injection of 20 cc. whole blood from a convalescent patient, and soon after dropped to sleep and the next day was practically recovered.

COMMENT

From the records just cited we see that most of our cases of poisoning from spider bites were men who had been bitten on the penis while sitting in an outdoor toilet in and about Los Angeles, after dark, in the late summer or early autumn. Most of the patients had seen the spider, which they described as black and shiny, and several mentioned the red spot on its belly or identified a specimen of *Latrodectus mactans* shown them. In no instance was there any marked swelling or inflammation present at the site of the bite. Severe pain, arising soon after the bite and increasing in intensity for an hour or two, was a constant complaint. It started generally in the neighborhood of the bite, but soon spread, and was localized in the abdomen and legs in nearly all of the patients, but was also felt in the chest, arms, genitals, groins, back, and "all over" in many. The pain, which was described as intense, excruciating, agonizing, severe, throbbing, cramping or aching, and was evidenced by writhing, tossing, doubling up and moaning, persisted for from four to eight hours undiminished and then gradually subsided during the course of the next twenty-four hours, but complete relief was not experienced for a number of days, and often not for a week.

Profuse perspiration, restlessness, nausea and vomiting, constipation, and dyspnoea were prominent symptoms, but vertigo, ataxia, chills, urinary retention, localized edema, and persistent hiccough were also noted. The abdomen was extremely rigid, but tenderness was usually absent, the reflexes were hyperactive, and priapism was noted in one instance.

A mild fever, generally around 100 and in no case going above 101.6, was usually found, but the

daily fluctuation in temperature was increased, and many of the patients showed a subnormal temperature at some time. The pulse was generally slow as compared with the temperature, being below 66 in more than half of the patients at some time, and the respiration, although occasionally accelerated for short periods at first, soon approximated a normal rate. The blood pressure was elevated in every instance, averaging 150 mm. mercury systolic with 87 diastolic on admission, but dropped rapidly on later readings. Leukocytosis was present on admission, averaging 14,800 in the cases examined on the first day in the hospital, the highest count being 21,800, but by the third day the average white blood count was only 10,700, the lowest being 5900. There was generally a relative increase in the polymorphonuclear leukocytes on the date of admission. The red blood count was variable, being above normal in several instances, and the color index was about one. Four of these patients had a positive Wassermann reaction. A trace of albumin and a few hyaline or granular casts were found in the urine in six cases, and blood was reported once.

As Doctor Bolotin observed, it is almost pathognomonic of spider bite for the physician reporting the case to say that he has been unable to find any similar cases reported in medical literature. Intensive search, however, revealed nearly 500 articles reporting cases of spider bites, or studies of spider venoms, in every part of the world. More than 150 instances of systemic poisoning from spider bites have been reported in the United States during the last hundred years, from more than a dozen states, but two-thirds of the cases recorded were in the state of California. Women have been rarely affected, and most of the patients were bitten on the penis while sitting in an outdoor privy in the evening in summer or fall. Local swelling or inflammation was uniformly absent, but acute pain was a constant symptom. This pain appeared soon after the bite, spreading apparently by contiguity over the abdomen, legs, chest, back and "all over," became intense, excruciating and agonizing within an hour or two and remained undiminished for more than six hours, then gradually subsided in the course of a day or two, but was not entirely gone for several days thereafter. It was often accompanied by profuse perspiration, nausea, vomiting, dyspnoea, mental perturbations, constipation, cyanosis, prostration, insomnia, speech difficulties, and acute urinary retention, and paralysis, convulsions, edema, rash, chills, vertigo, cramps, and jaundice have been described. An extreme board-like rigidity of the abdomen was the most striking physical finding, although abdominal tenderness was generally not mentioned, and tremors, twitching, muscle spasms and priapism have been reported.

TREATMENT

The constancy of the symptoms and findings in spider-bite poisoning is rivaled by the diversity of the treatments that have been employed. More than seventy-five remedies have been administered, each with the greatest confidence that this was the best line of treatment. Morphin, opium and laudanum, whisky or brandy, ammonia, atropin, magne-

sium sulphate, hot baths and fomentations, enemas, blood letting, strychnin, camphor and potassium permanganate have been among the most popular treatments, and one patient was operated on under the impression that he had an acute appendicitis. Nearly a dozen patients are reported to have died from the effects of a poisonous spider bite in the United States, but detailed descriptions are available in only a few instances. In these the symptoms seem to have been the usual ones, perhaps a little more severe, and death ensued in from fourteen to thirty-two hours.

The treatment at the Los Angeles General Hospital consisted of (1) sedation, with morphin, codein, bromides, chloral, veronal and hot applications; (2) stimulation, with spirits of ammonia, caffeine and strychnin; and (3) elimination, with magnesium citrate or epsom salts, castor oil, calomel, enemas, catheterization, and gastric lavage. Although we have not yet had a fatality, the large doses of narcotics required to give adequate relief made it desirable to seek some more efficient form of treatment. Convalescent serum was given intramuscularly in the last four severe cases. The results, while not absolutely conclusive, are sufficiently encouraging to warrant the continuation of the use of this treatment; and accordingly a supply of convalescent serum is now kept at the hospital in readiness for this purpose.

Desultory conversation with Californians shows that the condition of spider-bite poisoning is not a rare one, and the fact that eight patients were admitted to our hospital during the past year from this condition testified to the severity of the symptoms that may develop. Perhaps the usual location of the bite may disappear with the advance in building and plumbing in the state, but the abundance of these spiders in southern California make them an ever present menace. Even in the absence of a known history of spider bite or sting, an excruciating pain spreading over the entire body and becoming especially severe in the abdomen, legs and back, accompanied by nausea, vomiting and constipation, and a board-like rigidity of the abdomen, without definite abdominal tenderness, together with a low-grade fever, leukocytosis, and high blood pressure and spontaneously subsiding within a few days, form so constant a clinical picture as to justify a strong suspicion of arachnidism, or poisoning by the bite of the *Latrodectus mactans*.

This study was made possible only by the encouragement, advice and assistance of friends and co-workers too many to mention here, and it is with a deep sense of gratitude that we acknowledge indebtedness to all who have smiled upon this work and helped it to prosper. It is hoped that anyone who knows of any cases or facts in regard to this subject which have escaped our notice will communicate this information.

Science can occasionally treat disease successfully, and medicine should not forsake her precepts; but without the aid of that subtle art of understanding his fellowman, the physician will fail in successfully treating his patients.—George Draper, M.D., *Harper's Monthly Magazine*.

RICKETS AT HIGH ALTITUDES, WITH SPECIAL REFERENCE TO ITS OCCURRENCE IN UTAH

By EUGENE H. SMITH *

NO COMPREHENSIVE survey of the geographic distribution of rickets in the United States has been attempted. Most of the intensive studies of the disease have been made in large centers of population, at or near the sea coast, and among the dispensary classes.¹ As a small contribution to such a survey the following data are offered. They summarize observations made during a period of about three years in a small city situated upon the semi-arid western slope of the Rocky Mountains. The children were from families representing, as might be said, a cross-section of an average American community. Exclusive of a small group of Japanese children, tabulated separately, they were almost, without exception, of native parentage. About one-half were observed in the community well-babies clinic. This institution is not regarded as a charity, and as a consequence its clientele is drawn from all classes. The others were observed in the course of a general pediatric practice, and the findings in both groups are the result of my personal examinations.

The general hygienic surroundings of these children were much better than those of the poor of the larger cities. Ample fresh air and sunshine were available for all, and outdoor life is possible during the greater part of the year. Most families occupy detached one-story houses, and overcrowding is almost unknown.

GEOGRAPHY AND METEOROLOGY

Ogden, Utah (population about 35,000), is situated at an elevation of 4310 feet above sea level, with the Wasatch range of the Rocky Mountains (10,000 feet) rising abruptly to the east, and facing the Great Salt Lake Basin on the west. Its latitude is 41.1 degrees north, almost exactly that of New York City. Yearly averages for certain meteorological conditions prevailing in this region are compared with those of several of the coast cities of the United States in Table I.

The average of the actual hours of sunshine in this locality is therefore much greater than that of the coastal cities with the exception of Los Angeles. It is a region of scanty precipitation, low humidity, with a yearly temperature average about the same as New York City. Regarding the distribution of sunshine during the year, it may be added that, during the months of December, January and February, the sunshine averages 44, 45 and 47 per cent

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